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Jacob Berish

Skidmore College, jberish@skidmore.edu

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**Is Projection Bias Present within a General Manager's Decision-Making
Process within Major League Baseball (MLB)?**

*This thesis is submitted in partial fulfillment of the requirements for the course Senior Seminar
(EC 375), during the Spring Semester of 2019*

*While writing this thesis, I have not witnessed any wrongdoing, nor have I personally violated
any conditions of the Skidmore College Honor Code.*

Jacob Berish

Abstract

Throughout my research I seek to understand the role projection bias plays within Major League Baseball (MLB). Projection bias stems from the field of behavioral economics, which as a whole seeks to understand the psychological side of the individual's economic decision-making process. MLB teams have continually sought ways to better analyze the performance of players prior to signing them. By limiting projection bias, teams will be able to better allocate their funds to players who are most likely to remain consistent or even increase in performance following the contract. White and Sheldon (2014) show through empirical evidence that MLB players tended to increase their performance in the year prior to entering free agency. Their study also demonstrated that players tended to decline in performance following their contract. It is possible that this phenomenon known as contract theory is a reasoning for the decline in player performance; however, General Managers also may be at fault for this occurrence. In my research, I analyze players who have signed long-term deals while comparing their statistics pre and post contract. My results show which General Managers have been more susceptible to projection bias while also discussing the potential causes.

I. Introduction

In this paper I will seek to answer the following question: Does projection bias play a role in a General Manager's decision making process within Major League Baseball (MLB)? Projection bias refers to an individual's assumption that their tastes and preferences will remain constant over time. Within a General Manager's decision making process, the individual players are those who are valued as the tastes and preferences. The threat of projection bias within sports is critical as it can save professional teams valuable resources if the bias can be limited in future decisions. Professional team owner's may find this to be of utmost importance when hiring a new General Manager, specifically if they are considering someone who has already had a stint in the MLB. They will need to gauge whether certain General Managers display this bias in order to have a better understanding of who to hire if the position on their team is vacant. Projection bias is relevant not only within the MLB, but throughout all major professional sports leagues.

Ichniowski and Preston (2017) study projection bias within the National Basketball Association (NBA) by researching executives. To understand if there is a relevant bias they collect data on college basketball players, specifically within the March Madness tournament. They conclude that Division I basketball players who perform well within the final tournament, known as March Madness, tend to increase their draft stock for the NBA draft. This research is relevant to my study as it is the only paper that seeks to understand if upper management in the sports world displays projection bias when acquiring new players.

The role of a General Manager is to sign, trade and release both players and staff involved within the organization. It is therefore their job to analyze players' past performances as a way of determining their future value. As a way of analyzing players, it is essential to take into account their entire body of work rather than just their recent performances. Following a contract, it may be seen through statistics that a player will underperform.

The purpose of my paper is to determine whether or not a General Manager demonstrates projection bias while making decisions upon long-term contracts. In order to do so it will be imperative to analyze players' performances both prior to and following their contracts. A player's decline in play is often considered an underperformance when compared to their expected potential, which stems from their previous career performance. To be considered a knowledgeable General Manager, one needs to have the ability of predicting whether a player will decline in performance, remain consistent, or even outperform their previous career

statistics. It is without a doubt understood that all great General Managers are capable of making mistakes when signing players; however, I seek to understand whether certain General Managers have proven to display a pattern of projection bias over a period of many signings.

The contributions of this work will give the reader an understanding of both how and why certain General Managers display projection bias when signing free agents to long-term contracts. By analyzing long-term contracts in the MLB, I am able to reveal how projection bias when evaluating free agent signings differ drastically from that of drafting players, as shown in Ichniowski and Preston's (2017) study. General Managers are able to accrue data across many seasons in order to determine the likelihood of future success for an individual player. When drafting players, such as in the NBA, executives are often only given one year of data to interpret the best college players as it is often seen that they only play one year at their respective schools. This is due to the NBA's policy that forces potential players to wait one year following the graduation of high school. While March Madness serves as the setting for executives to display their projection bias, my paper uses short bursts of success in prior seasons along with All-Star appearances as a proxy to understand whether projections bias is evident.

After analyzing the data, it became evident that projection bias was exhibited within the signings of MLB players. It was seen that most players had tended to decline in performance following the signing of a long-term contract. Many General Managers were seen to sign players who had made an appearance in an All-Star game. Some General Managers even tended to specifically sign players who had been elected to the All-Star game the direct year prior to signing the contract. Brian Cashman in particular signed thirteen total position players to long-term deals. Ten of those thirteen position players played in an All-Star game the year prior to signing a deal. Eight of those ten players then proceeded to decline in performance when compared to their previous career statistics. The other two players relatively remained the same. This is just one example of projection bias that was evident within MLB General Managers.

Throughout the remaining paper I will lay out my research on how I came to reveal these results. In section two I discuss relevant literature in the fields of projection bias, contract theory, as well as decision-making on the General Manager's part. In section three I break down my analytical framework as well as my data collection. I then finalize my discussion by examining my results while mentioning potential ideas for future research.

II. Literature Review

Projection Bias

In the research paper, *Projection Bias in Predicting Future Utility* by Loewenstein et al. (2003), they discuss the role projection bias plays in a variety of economic situations. In Section V of their paper, they explain how projection bias can cause the misguided purchases of durable goods. The paper notes that people with projection bias are oversensitive to their momentary feelings when undergoing purchasing decisions. It is understood that people will over-value goods on 'high-value' days and undervalue goods on 'low-value' days.

In terms of my research, we can relate this to General Managers in baseball, as they may overestimate a player's abilities based off of a year in which they outperformed their career statistics. This season-long performance can be seen as a 'high-value' time period for the General Manager which sways their decision making when signing a player to a contract. A high-value day could also be found in the setting of playoffs as well as games in which the General Manager saw the player perform in person. If a player were to perform especially well in the playoffs, it is likely going to increase the stock of that player in the General Manager's mind. Despite that playoffs are played in the same manor as regular season games, it is assumed that more pressure comes with playing in them. Another factor of the playoffs is that they come directly before free agency, which begins directly following the seasons end. Recency bias complements projection bias in this particular setting.

The General Manager's infatuation for a player, due to what could be short-term success, plays a role in their projection of the player's future success. They often conclude that the burst of success will be reflective of their future performance, rather than taking into account the player's career statistics. The paper continues to conclude that people may still abide by 'rational' choices when making one-shot decisions; however, through observations of multiple decision-makers it can be seen that people, in fact, show projection bias within their decision making process. I will take this into account when analyzing General Managers, as some may make a decision that reflects projection bias, however, do not continue to exhibit the same habits. Years of data on long-term contracts should allow me to understand whether certain General Managers tend to continually display this bias when analyzing free agents.

In a different setting, Busse et al. (2012) discuss the role projection bias plays in purchasing a house or car in their paper, *Projection Bias in the Car and Housing Markets*. The paper analyzes

the relationship between the weather or season at the time of a purchase with the change in price and use of the house/vehicle purchased. The authors examine over forty thousand vehicle transactions and over four million house transactions, while taking into account the weather at the time of the purchases. For vehicles, they looked into the purchases of convertibles and four-wheel drive cars. When examining houses, they looked at those that had swimming pools and central air systems. The data significantly proves that consumers are more likely to buy a convertible on a summer day. To go along with this finding, they discovered that people are also more likely to buy a four-wheel drive car if there is snow or slush on the ground at the time of purchase. They also found that houses with swimming pools have higher selling prices in the summer months compared to the same house's selling price during winter months.

The Busse et al. paper supports my hypothesis due to its examination of projection bias. Despite the vast difference in settings, the paper shows a strong correlation to that of my study. The authors focus on consumers' tendencies to over emphasize their current state, specifically when considering weather and season when making decisions regarding the purchases of vehicles and houses. The findings in this research paper can relate directly to the decision making process of a General Manager. A General Manager may often be seen to sign a player specifically due to a short period of success, rather than considering the player's entire career performance. Similar to the paper, one can compare the seasons and weather to the 'burst of success' a player shows. General Managers may easily show the same biases that everyday people show when buying everyday products. The only difference is that General Manager's decisions occur on a more glorified scale. The paper mirrors the theory of General Managers making signings without the use of average career statistics, but rather using a more recent sample as a justification for signing a player.

The research paper *Weather, Mood, and Use of Antidepressants: The Role of Projection Bias in Mental Health Care Decisions (2015)* by Tarso Madeira discusses the role of projection bias on the effect of mental healthcare decisions. The author looks into the effect of the weather on the diagnosis of depression in patients. The analysis goes further to look into the effect of the weather on the amount of new prescriptions of antidepressant medication, as well as refilling existing prescriptions. The weather that is associated with the antidepressant prescriptions is quantified as the amount of cloud covering, but is also expanded into snow, rain, and temperature. The most significant data comes from the winter months, and the stronger of those

results are in the Northeast and Upper Midwest United States. The findings from Madeira's paper show that the effect of the weather trigger people to feel more depressed than usual, which is seen by their doctors who prescribe antidepressants. The weather influences the patient to make less cost-effective decisions, or even lead them to seek treatment when they are not depressed or are not in need of treatment.

The findings of this research paper are significant to General Managers' acquisitions of players with the assumption that the player is more skilled than they are in reality. General Managers will be swayed by the players' recent history instead of career statistics. There is then a tendency to make long term decisions based on the recent history. Projection bias influences the General Manager to recall a smaller sample size of history, and therefore make a less informed decision. This relates directly back to the patient's lack of a cost-effective decision when seeking treatment during periods of poor weather conditions. Because a General Manager's role is to make the cost-effective decisions that lead to a successful team it is of utmost importance for them to not overvalue recent trends in a player's performance.

Chang et al. (2016) examine projection bias in their research paper *Something in the Air: Projection Bias and the Demand for Health Insurance*. The paper takes an in depth look at the effect of air pollution on daily purchasing increases of health insurance policies. They find significant data showing that when air pollution is high, individuals are more likely to purchase an insurance contract. When air pollution is low and the contract is still within the ten day "regret period" after purchase, the likelihood of cancellation is greater. One interesting finding that is relevant to my study is that transitional periods showed to have a significant influence on product markets. In the case of General Managers, this transitional period can be compared to the 'burst of success' that players show prior to being signed.

The Chang et al. paper is similar to my research because it suggests recent history, or in my case recent statistics, have a stronger effect on decisions than long term and generally more representative information. General Managers' decisions are related to this after a breakout year, or an anomaly year, when a player is uncharacteristically better than they have historically been. One explanation for the findings in the study is the non-negotiable price of insurance in China, where the data was collected. Another limitation of the findings is that some consumer's financial status is unknown; therefore, people may suddenly be able to purchase or realize they can't afford health insurance. This differs from my study, as we are fairly certain of the

expenditures each team possesses coming into each free agent season. Despite the differences, the Chang et al. paper contributes to my research and helps to understand the characteristics and variables that are valuable within the data collection.

Contracts in Major League Baseball

Within the MLB it is important to understand how contracts may play a role in influencing a player's performance. Maxcy et al. (2014) looks into the effect of contracts on MLB players' performance. The main question that the authors sought to answer was whether performance of MLB players increased in the year prior to their contract expiring, as well as decreased performance after the players have negotiated a new contract. They more heavily investigate the "shirking" hypothesis, which refers to a players decrease in effort and is therefore displayed after they have negotiated a contract. Past studies looked into the "shirking" hypothesis, but lacked comparison of players who act with strategic behavior and those who are in a period when they are not projected to shirk. In other words, the authors compare players who are nearing contract negotiations and those who are already under contract. From the research, Maxcy et al. (2014) found that playing time is higher and players are less likely to end up on the disabled list immediately before contract negotiations. It was seen that players are more willing to "gut out" smaller injuries at this time, even if it will have a negative impact in the long run. Playing time is often higher than average before negotiations because players are trying to enhance their bargaining power. By increasing their stock prior to free agency it is likely that a General Manager will be forced to commit more money to the player as they are forced to battle other General Managers for the player by offering more money.

The findings of Maxcy et al. are relevant to my paper because it reveals that contract negotiations do have an impact on player performance. The paper helps me to understand a limitation of my study that is the possibility of a decrease in performance after a contract, instead of a return to historical average. Players can have streaks of performance levels and this paper helps to realize that in data collection I would need to study players' patterns to assure their actual average performance and therefore confirm the projection bias of the General Manager. Keeping in mind the findings of the study, it is imperative to understand that a poor performance following a contract is not always due to bad decision-making from the General Manager, rather it can also be explained by the player's intrinsic motivational factors that caused their downturn in performance. A copious amount of data will allow me to determine if the General Manager is

in fact repeatedly making poor decisions or if a few players are the causes to a limited amount of underwhelming performances post-contract.

In a very similar setting, Matthew J. Cahill (2002) sought to investigate the effect of a new contract on a player's production. The question that the paper tried to answer was if a MLB player's performance changed after he signed a long-term contract during his arbitration years. Arbitration in the MLB is when players who have been in the league for between three and six years, contract expires; therefore, they have the ability to ask their team for a higher salary. MLB players do not become a free agent after contract expirations until they have played over six years in the league. The arbitration process goes to a panel for moderation and judgment. The study looks into whether job security, or lack thereof, is a driving factor in a player's performance. They used the data from thirty MLB position players (non-pitchers) that were active at the time and had long-term contracts before 2010. The statistics that were used in the study were the following: Slugging Percentage, On Base Percentage, Runs Created, and Batting Average on balls in play. These stats were tracked for a six-year window around the signing of the long-term contract (three years before the contract and three years after). The results of the analysis showed that approximately half of the players had increased performance and the other half had decreased performance, while a minority had no change in performance. The findings of the paper therefore convey that there was in fact a change in performance following the signing of a long-term contract, but there was no distinct result showing whether most players increase or decrease performance.

This paper is relevant to my study because it examined a similar theory, but used different statistics. Cahill's paper left out the use of WAR (Wins Above Replacement), which I see as one of the most useful and telling statistics. Another limitation of this study to take into account is that there was a small and specific sample size; therefore, the data could be skewed and may not be representative of the population as a whole. The study contributes to my paper because it shows a limitation of my study in that there can be increases or decreases in players' performance after contracts based on intrinsic motivators. The findings contribute to my research topic of exploring General Manager's projection bias based off of an inconsistent season. The paper suggests it is common to have changes in levels of performance surrounding contract years, which can have a profound effect on contracts. My research will seek to understand if the General Managers in my data collection overvalue these inconsistent seasons.

White and Sheldon (2014) co-authored a research paper that combines an economical and psychological study. They sought to find out how extrinsic factors, like pressure and scrutiny, affect players' motivation and performance in the year leading up to a new contract and the year following a new contract. They examined certain periods throughout players' careers in which motivational factors, like a contract year, are particularly salient. One of the main focuses was that money is the primary motivator in the year before the new contract was negotiated. They sought to measure these extrinsic factors by seeking patterns in performances of players around the time of signing a contract.

The findings from their study were significant because it supports the contract year theory that players increase performance when their contract is going to be up for negotiation. They found more minor significance in the data they collected from MLB in comparison to the NBA data. They found slight decreases depending on the statistic in the years following the contract negotiation. One consistency they found in both professional leagues was that an increased performance in the year prior to a new contract did increase the player's salary in the new negotiation. Though, the increase in salary had no effect on performance in the year following the new contract. The main limitation of this study was the lack of ability to clearly measure motivation. White and Sheldon's (2014) research contributes to my paper because it also suggests that players often perform above their career average before they look to engage in negotiating a new contract. General Managers show projection bias by relying too heavily on the recent statistics of these players. Even though there was less significance found in the MLB, any significant statistics of increased performance before a contract can affect the decision making of the General Manager.

General Managers Decision-Making

Ichniowski and Preston (2017) co-authored an examination of projection bias in March Madness in their research paper *Does March Madness lead to irrational exuberance in the NBA Draft? High-value employee selection decisions and decision-making bias*. The paper goes into detail regarding the way in which a player's performance, in terms of team and personal success, effect their position in the NBA draft. The performance of the players is then compared to their average career statistics. The authors argue that the March Madness performance is weighted too heavily, but it is not irrational. The paper finds significant evidence that players performance in March Madness has an impact on their draft position. They also find that there is

no evidence of players NBA performance being worse after they had changed their draft status during March Madness. They also found evidence that a player who experiences an unexpected draft bump due to March Madness is more likely to rise to stardom in the NBA.

This paper ties into my study as it focuses on the projection bias seen during General Manager decisions following a major burst in success. Despite that some players' performance begin to rise on average, the decisions made by NBA executives regarding a players' future can be explained by projection bias as it is based on such small, and in certain cases, momentary samples of play. The decision making of an NBA General Manager can be directly translated to that of an MLB General Manager's decision making process. Both can be seen making decisions based off a player's burst of success, despite these successes coming in different settings. The MLB is more commonly known for being filled with "slumps" and hot streaks by even the best players. Baseball is a sport that has an average failure rate of over seventy percent for hitters; therefore, there is a need to evaluate players over a longer period of time to assess their skill and ability. Unlike collegiate basketball, there is no event in college baseball that is similar to March Madness, in its high stakes and intensity, though the College World Series is the closest comparison. MLB General Managers are not supplied with a similar arena for viewing and evaluation like March Madness; therefore, the projection bias based off of the College World Series would have a significantly lower impact than that of March Madness.

Ichniowski and Preston's (2017) study has many similarities to mine; however, both the setting and empirical research will differ. When evaluating players in college it is important to gauge the play of all players as it is primarily dependent on the team's draft position as to who they will end up picking. Because this paper focuses on the drafting side of acquiring players rather than the free agent acquisition side it differs greatly in terms of the monetary risks. When drafting a player, regardless of the team's draft position, a team is not so much worried about their financial well-being. The risk of missing out on a potential star is a greater threat to NBA executives than their need to pay the player they draft. In my study, however, the greatest risk to signing a player to a long-term contract is the need to pay them a substantial amount. It is important for MLB General Managers to properly allocate their funds in order to maximize their team's ability to find success. This is why understanding and recognizing projection bias is a key factor in order to properly manage the organization's total budget.

The research paper, *Upper Echelons in Professional Sport: The Impact of NBA General Managers on Team Performance*, by Juravich et al. (2017) examines the influence of General Managers on NBA teams. The authors look into decision making by focusing on the General Manager's tenure, functional experience, technical experience, age, and education. Each of these characteristics of a General Manager factors into the way he/she shapes their team and therefore the major decisions they have to make regarding player contracts. Previous playing experience and education are relied on heavily because the authors assume they have some of the largest impact on problem solving and strategic approach. The authors use statistics on number of wins and the efficiency of wins, calculated by the number of wins in a season divided by the team's payroll.

Juravich et al's (2017) paper contributes significantly to my research, but also has various limitations. The paper acknowledges that in the NBA not all General Managers are solely in charge of acquisitions and the construction of contracts. The study does not examine General Manager's acquisitions specifically, but just the success of their team, which I plan to look at more in depth. My paper will look to expand on the research done by Juravich et al. (2017) by applying their theories to Major League Baseball. This paper supports my hypothesis that General Managers have a profound impact on the team, but I will expand upon it by having a larger sample size because of the longer 162 game MLB season. Juravich et al's (2017) paper helps to guide my research in showing me which characteristics of General Manager's to analyze. My hypothesis will work in conjunction with this research paper to prove that projection bias plays a large role in the General Manager's decision making process and therefore the success of the team.

III. Analytical Framework

In order to establish projection bias among General Managers in the MLB, the performance of players will need to be evaluated before and after the signing of a long-term contract. I will take into account a player's career statistics as well as their statistics within the "breakout" season and compare them to their performance after receiving the contract. With the use of Baseball Reference, I collected data from all players who signed long-term contracts by the General Managers that are later mentioned. To understand a player's career statistics prior to the contract, I took data from all years played in the MLB up to that point. For the 'after' data, I looked at the player's statistics for the duration of the contract under the team in which the player

signed with. This ensured that I would only be accounting for the decision making explicitly done by the General Manager that executed the signing.

In the case of my research, a 'long-term' contract can be defined as a contract of three or more years. White and Sheldon's (2013) paper discusses the contract year syndrome in both the National Basketball Association (NBA) and the MLB. When gathering data, they ensured that they had statistics on players for three years prior to and following their contract. This allowed for them to capture enough statistics to allow for them to evaluate their hypothesis of a contract year syndrome. On a similar note, I need to accumulate enough data both prior to and following a contract in order to assess whether certain General Managers exhibit projection bias. In some cases, players may get injured in one of their first two seasons. The limited data due to injury would therefore not be a fair assessment of the performance over that time period. This is why I find it necessary for a long-term contract, in the sense of my research, to be a minimum of three years.

The ten MLB General Managers, along with their respective teams, that I will be examining throughout my research are: Mike Rizzo (Washington Nationals), Jon Daniels (Texas Rangers), Neal Huntington (Pittsburgh Pirates), Brian Cashman (New York Yankees), Dayton Moore (Kansas City Royals), Dave Dombrowski (Florida Marlins, Detroit Tigers, Boston Red Sox), Dan Duquette (Montreal Expos, Boston Red Sox, Baltimore Orioles), Doug Melvin (Texas Rangers, Milwaukee Brewers), Billy Beane (Oakland Athletics), and John Mozeliak (St. Louis Cardinals). Doug Melvin, Billy Beane, and John Mozeliak are the only three General Managers from my data set that are currently either retired or hold a different position within Major League Baseball. All ten of the listed General Managers have held their position for at least ten years. The duration of time for which the General Manager holds the position is important, as it gives a deeper understanding of whether they have displayed projection bias. The more data that is accrued for each General Manager, the more accurately it will be to analyze my hypothesis. There are various other General Managers both current and former that have held the position for a lengthy period of time, however, these ten are the only ones to hold their positions for at least ten years within the last two decades.

To calculate 'performance', a variety of statistics will be taken into account. When analyzing position players (hitters), I will be looking at the following statistics: batting average (BA), on-base percentage (OBP), WAR, and All-Star appearances. For BA and OBP, I will be taking the

players career statistics prior to the signing and compare it to their statistics during the time in which they are playing under the long-term contract. Prior to the signing, the player's BA and OBP will be labeled as BAv_g and BOBP. The 'B' in this case standing for before. The variables for the player's BA and OBP during the long-term contract will be labeled as AAvg and AOBP. The 'A' in this case standing for after.

Cahill's (2014) research looks to understand the change in an MLB player's performance following a long-term deal. To calculate for such performance, Cahill uses OBP and slugging percentage as his main statistics to analyze a hitter. The paper only looks at position players; however, much of my conceptual framework stems from his way of analysis. To determine change in performance he creates a percentage change of each player's stats prior to and following their long-term contract. By doing so he is able to capture whether each player declines, improves, or relatively remains the same. My before and after variables stemmed from his research as well as my tables which indicate whether a General Manager's players tended to improve, decline, or remain the same in terms of production.

WAR will be used to understand the performance of both position players and pitchers, and therefore will be analyzed the same. The variables will be labeled as B3WAR and A3WAR. B3WAR stands for the total WAR in the three years prior to signing the contract, while A3WAR stands for the total WAR of the player from the first three years following the contract. A3WAR will act as the dependent variable within the regression as I look to understand the causation of future performance.

WAR is a statistic that looks to account for a player's overall contribution to their team. Slowinski (2010) describes WAR as an attempt to understand how much value a team is losing if a player were to be removed from the team and an 'average' replacement was to be inserted. For instance, in 2012 Mike Trout lead the league in WAR with a value of 10.5. Compared to Adrian Beltre who in the same year had a WAR of 7.2, you would be able to determine statistically that Mike Trout provided more value to his team as he is worth 10.5 more wins to his team. Many other pieces of literature that seek to understand player performance within the MLB do not take into account WAR. This is primarily due to the fact that WAR has become increasingly popular in recent years, so studies that were conducted more than 5 years ago had little to no use of the statistic.

Finally, I look at All-Star Appearances as a metric to possibly identify projection bias from the General Managers perspective. The All-Star Game occurs halfway through every MLB season. It incorporates the best players from each division, both the American League (AL) and the National League (NL). The players chosen often derive from the votes of fans, coaches, players, and the media. It is therefore understood that the best players based on statistics and overall performance are often chosen. I find All-Star appearances to be interesting, as they are an almost meaningless statistic, however, have the possibility of affecting a General Manager's decisions. Because an All-Star appearance is only based off a player's statistics from the first half of the season, it is not a true indicator of the player's performance over an entire season. This is why I believe some General Managers have a tendency to be over-influenced by players who have either made multiple All-Star appearances, or have just been in the All-Star game the year prior to signing the contract. I have thus created two variables labeled as ASTotal and ASPrior. ASTotal accounts for the total amount of All-Star appearances prior to the signing, while ASPrior is a dummy variable that accounts for whether a player was in the All-Star Game the direct season prior to signing the long-term contract. Both of these variables will act as independent variables within my regression.

BA is one of the most commonly used statistics when analyzing the performance of a player's offensive abilities. The accumulation of the player's batting average throughout the extent of the long-term contract will be one of my independent variables for the regression and is labeled as AAvg. The stat calculates a percentage of how many times a player is able to get a hit when compared to how many total at-bats the player has over the same time span. OBP is also a heavily used metric in baseball for hitters. The statistic calculates how often a player is able to reach base out of all the plate appearances they may have. Reaching base is defined as getting a hit, walking, or getting hit by a pitch. This metric is relevant, as reaching base is a major component of success for not only that player but the team as a whole. It will also be an independent variable within my regression and labeled as AOBP.

When analyzing pitchers, I will be taking the following statistics into account: earned run average (ERA), walks and hits per innings pitched (WHIP), WAR, and All-Star appearances. WAR and All-Star appearances will be calculated the same way it was for hitters. For both ERA and WHIP, I will take the player's career statistics based on both these metrics leading up to the contract and compare it to that of their statistics following the long-term contract. The variables

for prior to the contract will be labeled as BERA and BWHIP. The variables used to analyze the statistics following the contract will be labeled as AERA and AWHIP. Both BERA and BWHIP will be used as independent variables in my study when running the regression.

Using the statistics previously mentioned, I will be able to develop a baseline of career performance for each player involved in the data set. When analyzing the data set I will seek to compare each player's performance in years following their contract to their respective baseline as well as their "breakout" season. This will enable me to develop an understanding of changes in performance as well as the success of the General Manager's decision making process. For this study I hypothesize that General Managers exhibit projection bias due to the increased performance of players within years prior to contract negotiations.

I plan to be mindful of the age by at which the player is signed in order to limit any errors within the study. I expect that younger players who sign a long-term deal are more likely to perform positively compared to players nearing the end of their careers. This is likely due to the motivation a younger player has to prove his overall worth moving forward in his career. Krautmann (2009) discusses this in his paper in which he argues that players who are less likely to sign a subsequent contract have a large statistically significant reduction in performance compared to expectations. The reasoning for this is that younger players, despite potentially already being in a long-term deal, have the ability to obtain another significant contract later on in their career. In contrast to younger players, older players are likely less motivated as they understand that they are extremely unlikely to receive another long-term contract. In this case, the only extrinsic motivational factors would be career statistics in order to formulate a case for the Hall of Fame and production for team success.

A second way I seek to understand my hypothesis is by analyzing the decisions of General Managers over periods of time. It can be seen that it is possible for General Manager's to make irrational decisions that display projection bias, but do not consistently display this bias throughout their career. I incorporate all long-term decisions that each of the General Managers in the data set have made over his career up to this point. By doing so it will allow me to gain enough data on each manager so that it can be determined whether or not they may display projection bias. By analyzing a General Manager's tendencies, I can assess whether or not they were able to realize their mistakes by not committing a similar mistake in the future. If General

Manager's show that they are prone to signing players who have one notable year then it is likely that I can attest this behavioral pattern to projection bias.

IV. Empirical Evidence

With my data set that I have collected and previously described in detail, I ran a few regressions to help understand the impact that relevant statistics and All-Star appearances have on future performance. To capture 'future performance' as a whole I have chosen WAR in the three years following the long-term contract to encapsulate the overall performance each player displays. The multi-variate model for both pitchers and position players can be seen below.

Position Players:

$$A3WAR_i = B_0 + B_1BAvg_i + B_2BOBP_i + B_3ASPrior_i + B_4ASTotal_i + B_5B3WAR_i + E_i$$

Pitchers:

$$A3WAR_i = B_0 + B_1BERA_i + B_2BWHIP_i + B_3ASPrior_i + B_4ASTotal_i + B_5B3WAR_i + E_i$$

In both equations, I am testing to understand if previous career statistics along with All-Star appearances have any affect on future performance. It will be important to gauge All-Star appearances in particular, as I believe that it is a specific statistic that General Managers tend to over-emphasize when evaluating a player. Data on ERA, WHIP, Batting Average, and OBP are all taken from the total years prior to the signing of a long-term contract. The total All-Star appearances variable accounts for all years that the player made the All-Star game, while the variable for All-Star appearances prior only accounts for whether the player made an appearance the direct year prior to signing the contract. I expect to find this variable to be particularly important as projection bias would note that this prolific play would cause the General Manager to expect this exact play for years to come. In addition to these variables I included the variable for total WAR the three years prior to signing the contract in order to account for performance prior to signing the contract. I use B3WAR as a control variable in the model as a way of clarify the relationship between A3WAR and my other dependent variables.

Based on the results, we can see in Table 1 that batting average before the long-term deal along with All-Star appearances the year prior to the deal have the largest positive impact on future performance (A3WAR). Despite it's impact on future performance, the variable for All-Star appearances the year prior is the only variable that does not show any level of significance.

BAvg along with the control variable, B3WAR, are significant at the 1% level. Both OBP before the long-term signing as well as total All-Star appearances show to have a negative impact on future performance. The significance of BAv was expected as White and Sheldon (2013) note in their research that many prominent offensive statistics including BA play an incremental role in determining the future success of a player, specifically in contract years. This data also displays that it may tend to be important for General Manager's to consider a player who just made an All-Star game with high regard. This is important when we look at the changes in performance of players signed by each General Manager.

When looking at the second regression in Table 2 that looks to understand future performance of pitchers, we can see a number of results. All dependent variables show to have a positive affect on A3WAR except WHIP. The control variable, B3WAR, which takes into account an accumulation of performance the three years prior to signing the long-term contract, is the only variable that shows any significance. B3WAR is significant at the 1% level. The results for pitchers differed from hitters, as it is seen that All-Star appearances prior plays a larger role when analyzing a hitters future success than that of an All-Star appearance the year prior to a long-term deal for a pitcher. General Managers may limit projection bias by analyzing not only a players career statistics to the fullest, but also looking at their total All-Star appearances as it may show the reliability of a pitcher throughout his career.

With any study there are limitations that are involved that can have an impact on the understanding of my hypothesis. The first limitation is the number of total General Managers that implement long-term signings throughout their careers. There are ten total General Managers in my study. I chose these ten General Managers based on the following criteria: have been in the General Manager role for at least ten years, started their role after 1995. There were ten total General Managers that met these pieces of criteria, however, not all of them tend to use long-term signings throughout their tenure. Those who tend to not use long-term signings show to be a slight difficulty within my study. Because I am only looking at long-term signings it is hard to identify whether or not those General Managers who do not implement long-term signings exhibit projection bias. For my study I plan on still including these managers and their limited long-term signings as they still may offer data that is relevant. Whether or not a General Manager performs limited long-term acquisitions, it is still important to include their data as it is a different style of contract negotiations that is used within the MLB.

A second limitation that displayed itself throughout data collection is that some players sign a long-term deal of three years and end up either getting released or traded in the third year of their contract. When collecting data, I decided that it is important to include these players as many of these signings tend to show that the General Manager made a poor decision and likely show some resemblance of projections bias. For the data collection, I included the data of these players in the two years following the contract along with the partial data they have in the third year of which they were released or traded. Although the contract was not enacted for the full extent, the partial data is important in understanding how the player performed prior to signing the contract when comparing it to their career statistics.

A third limitation I discovered when collecting the data was the signing of players who did not have experience in the MLB. One example of this is right-handed pitcher Yu Darvish. Darvish was signed out of the Japanese professional baseball league where he found success. Yu Darvish was signed to a six-year deal by the Texas Rangers without any prior experience in the MLB. General Manager Jon Daniels signed Darvish as he showed tremendous talent out of the Japanese league. Statistics on career performance within the MLB was therefore not available for collection. Despite not being included within the data set, I believe it is still important to understand that signings like these occur somewhat regularly by General Managers across the MLB.

Another limitation I recognize is that player's may experience intrinsic motivational factors. Discussed in the study by Maxcy et al. (2014), they mention a potential "shirking" hypothesis. This hypothesis refers to a player's decrease in performance following the negotiation of a new contract. This shows that in some cases the player may be intrinsically motivated in ways that decrease their performance, which in turn do not reflect the decision making process of a General Manager. This limitation also ties in the fact that player injuries may occur following the signing of a long-term contract. If a player were to acquire an injury in the year following the signing of their contract, it will likely result in a decrease in performance. An injury is a factor that General Managers do not have the ability of predicting; thus, they cannot be held accountable for.

A final limitation present in my study is the potential for limited options in the free agency market. The free agent market can be defined as players who are not currently signed to a contract on an MLB team and are therefore looking to be signed by a franchise. It is possible that

in a given year a team may be on the hunt for a particular position to fill within their team roster. In the given year, there may be limited options in terms of available players at that certain position, thus giving the General Manager little to no option when attempting to fill the position. While signing a player in these circumstances may display projection bias, it is also essential to understand the limited choices the General Manager was given.

To account for limitations within my data I ran a Breusch-Pagan/ Cook-Weisberg test to account for heteroskedasticity. For both regressions, I failed to reject the null hypothesis. For the linear regression run with the data of the position players, I received a p-value of 0.716. For the linear regression for the pitchers, I received a p-value of 0.9743. I also ran an rvfplot to account for heteroskedasticity. Each plot, one for the position players and one for the pitchers, can be seen under graphs five and six. Neither graph displays any sort of pattern, thus confirming any concerns about heteroskedasticity.

With the data collected from seasons prior and following the contract, I found it imperative that change in terms of percentages would be important when understanding a General Manager's projection bias. In Table 7 you can see every general Manager I studied to go along with every long-term signing they made as a General Manager before the start of the 2016 season. It is clear that different General Managers have different strategies, as some have shown to sign many players to long-term deals while others tend to rarely sign a player for more than two years. This is one limitation to my study as there is limited data on those who tended to implement few long-term signings throughout their careers as General Manager. The percent change was calculated by taking into account all statistics by the player (including WAR), in order to understand the difference in performance following the signing of a long-term deal. In each table, there is a column for whether the long-term signing improved, declined or remained the same. A decline or increase in performance can be seen if the player's performance is 5% lower or higher, respectively, compared to their previous career statistics. Therefore, players who are categorized as remaining the same after the contract signing declined or increased in performance within the 5% level ($-5\% < p < 5\%$).

We can see that Brian Cashman made the most long-term transactions. This is not surprising as he has been the General Manager for the New York Yankees since 1998. The Yankees have shown to have the highest payroll in baseball almost every year since as they have the highest valued team in the MLB. Schmidt and Schreiber (2008) note that for the 2009 season the

Yankees occupied the four largest contracts in baseball which included: Mark Teixeira, Derek Jeter, Alex Rodriguez, and C. C. Sabathia. The article also discusses the fact that Yankees are at a significant advantage due to their, almost unlimited, expenditures. Because there is no salary cap in baseball, a team such as the Yankees has the ability to sign significantly more high-value players, which is clearly seen within my data.

The results for Brian Cashman show that despite the number of long-term signings, many of the players declined after their contract. 14 out of the 20 long term signings showed to decline (at least 5%). We can see that Brian Cashman displays projection bias in some sense as 11 out of the 20 signings had made the All-Star Game the year prior to signing. For position players in particular, Cashman signed 10 players out of his 13 total that were in the All-Star Game the year before being signed. This could be a sign that the player is in fact a valuable asset; however, it could stem from a bias that Cashman shows towards those involved in All-Star Games. Based on the number of declining players we can likely attest the overall change in performance of the players to the projection bias exhibited by Brian Cashman.

Many General Managers tend to have players who decline following a long-term contract. This shows that it's possible that making long-term acquisitions are not always the greatest financial move for the organization. The decisions of General Managers are often scrutinized as they play a fundamental role in the success of a team; however, it is important to keep in mind that a player is the one with the ability to change their performance not the General Manager himself.

V. Conclusion

Throughout the structure of this paper I seek to understand whether projection bias is evident in General Managers within the MLB. To help me understand this hypothesis I collected a series of data that consisted of player performances, in terms of statistics, both prior to and following the signing of a long-term contract. The research sought to understand not only whether projection bias was evident, but if there was a clear method of understanding whether certain General Managers displayed this bias through a compilation of long-term deals. I found that projection bias was likely evident in a set of MLB General Managers; however, it could not be concluded that all of them exhibited this bias due to limited signings by some teams. As a final result, I can clearly note that All-Star appearances play an influential role in the causation of projection bias within the realm of the MLB.

My paper poses many potential contributions to current literature. One contribution is the understanding of a General Manager's decision making process. There have been limited studies within this field of research, especially within the context of the MLB. By analyzing General Manager's decision making I have been able to determine the effectiveness of particular General Manager's within the MLB. This allowed for me to understand possible tactics that successful General Manager's implement when acquiring players. The study will also help in the hiring process of General Manager's by the team owners. The results will be particularly useful for owners as they will get an understanding of which General Manager's are more likely to make rewarding decisions based on their behavioral decision making. Another contribution my study exhibits is the use of WAR. As previously mentioned, this statistic has become increasingly popular over recent years and is a valuable statistic when understanding both a player's performance as well as their value to a team. By including WAR, I believe I can track a more accurate representation of a player's performance, which will in turn allow me to better understand the efficiency of the General Manager's decision making process.

There are a few directions for potential future research. One direction would be staying within the field of professional baseball. By doing so, I would look to collect data on other potential causes of projection bias. One example of this could be the playoffs. By including playoff data, the study could look to understand a different causation of projection bias within MLB General Managers. A second direction to take with this study would be to analyze projection bias in a different professional sports setting. Projection bias will most definitely be evident within all major professional sports leagues. By performing the study within different settings, one could get an understanding of how different sports leagues may have different causations for projection bias. Because many professional sports are likely to incorporate some level of projection bias, it is vital to get an understanding of how each bias differs in each sport. Despite any differences, all research will seek to understand how General Managers may allocate their funds more efficiently.

VI. Tables

Table 1.

Position Players Regression Outcome

Linear Regression

A3WAR	Coef.	St. Err.	t-value	p-value	[95% conf	Interval]	Sig.
BAvg	213.341	57.036	3.74	0.001	97.163	329.519	***
BOBP	-83.321	41.130	-2.03	0.051	-167.100	0.458	*
ASTotal	-0.572	0.274	-2.09	0.045	-1.129	-0.015	**
ASPrior	2.632	1.654	1.59	0.121	-0.737	6.000	
B3WAR	0.615	0.156	3.95	0.000	0.298	0.932	***
Constant	-29.949	13.367	-2.24	0.0032	-57.176	-2.723	**
Mean dependent var.		7.758		SD dependent var.		6.100	
R-squared		0.635		Number of obs.		38.000	
F-test		11.158		Prob > F		0.000	
Akaike crit. (AIC)		217.909		Bayesian crit. (BIC)		227.734	
***p<0.01, **p<0.05, *p<0.1							

Table 2.

Pitchers Regression Outcome

Linear Regression

A3WAR	Coef.	St. Err.	t-value	p-value	[95% conf	Interval]	Sig.
BERA	1.713	3.151	0.54	0.591	-4.741	8.166	
BWHIP	-4.403	16.588	-0.27	0.793	-38.383	29.577	
ASTotal	0.488	0.526	0.93	0.362	-0.590	1.566	
ASPrior	0.011	2.268	0.01	0.996	-4.636	4.657	
B3WAR	0.724	0.184	3.92	0.001	0.346	1.102	***
Constant	0.004	12.641	0.00	1.000	-25.891	25.899	
Mean dependent var.		6.012		SD dependent var.		5.224	
R-squared		0.521		Number of obs.		34.000	
F-test		6.082		Prob > F		0.001	
Akaike crit. (AIC)		194.895		Bayesian crit. (BIC)		204.053	
***p<0.01, **p<0.05, *p<0.1							

Table 3.

Position Players VIF Outcome

	VIF	1/VIF
BAvg	2.52	0.396
BOBP	2.48	0.404
B3WAR	1.78	0.561
ASTotal	1.74	0.574
ASPrior	1.64	0.610
Mean VIF	2.03	

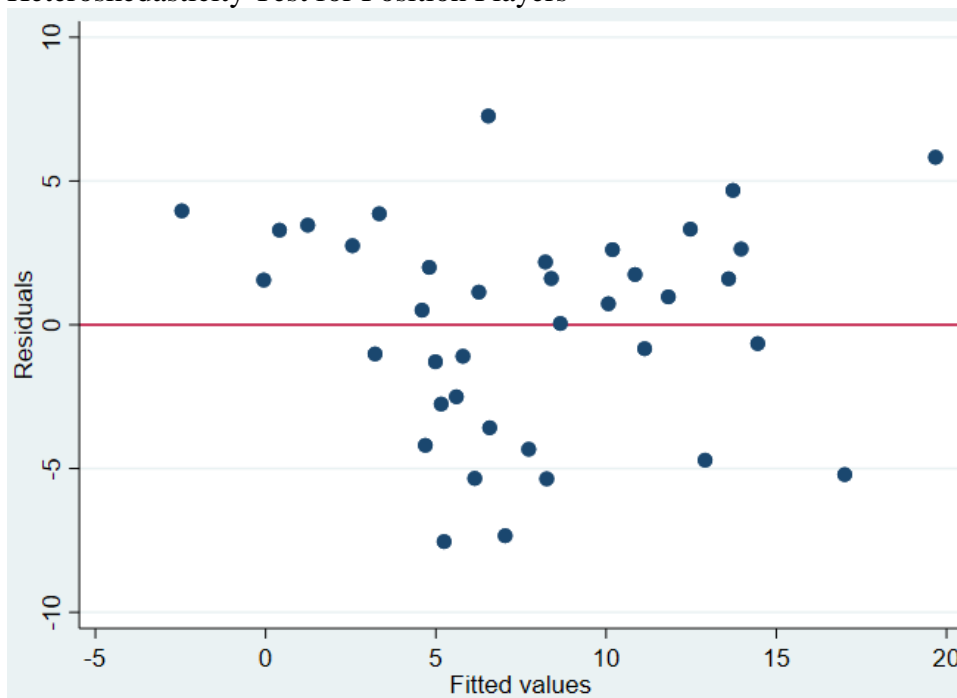
Table 4.

Positions Players VIF Outcome

	VIF	1/VIF
BWHIP	6.99	0.143
BERA	6.66	0.150
B3WAR	1.59	0.629
ASTotal	1.98	0.0506
ASPrior	1.18	0.0849
Mean VIF	3.68	

Graph 5.

Heteroskedasticity Test for Position Players



Graph 6.
Heteroskedasticity Test for Pitchers

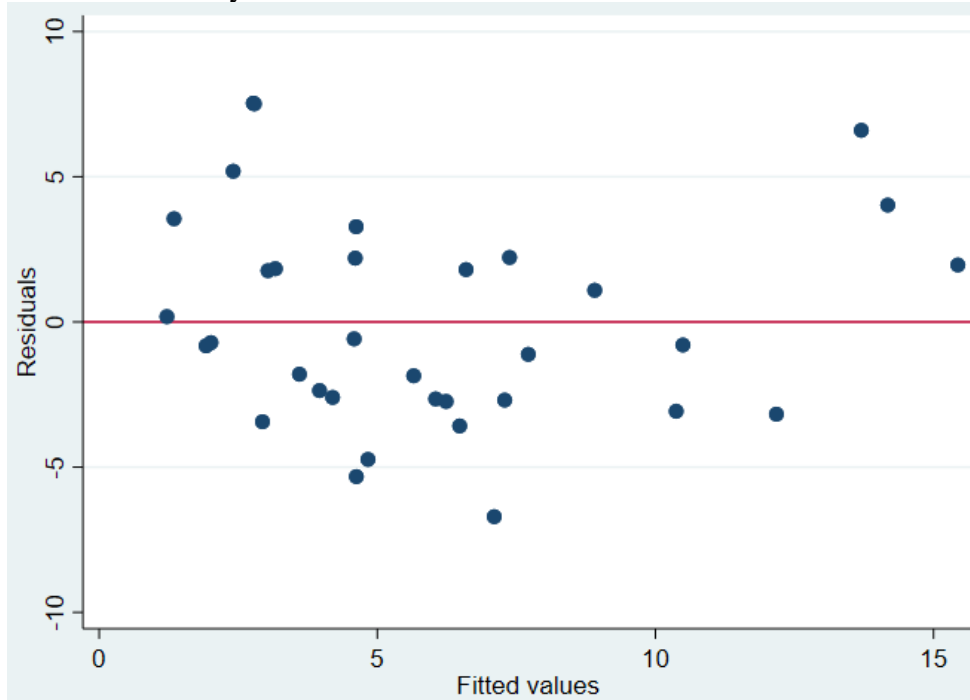


Table 7. (Starting on next page)
Change in Performance of Players who Signed Long-Term Contracts (Broken Down by each
General Manager)
H=Position Player, P=Pitcher

Mike Rizzo

Players Who Improved

<u>Player</u>	<u>% Change</u>
Daniel Murphy (H)	63.31%
Max Scherzer (P)	29.30%
Shawn Kelley (P)	57.38%

Players Who Declined

<u>Player</u>	<u>% Change</u>
Jayson Werth (H)	-18.12%

Players Who Remained the Same

<u>Player</u>	<u>% Change</u>
N/A	

Jon Daniels

Players Who Improved

<u>Player</u>	<u>% Change</u>
Adrian Beltre (H)	10.22%

Players Who Declined

<u>Player</u>	<u>% Change</u>
Shin-Soo Choo (H)	-26.47%
Kevin Millwood (P)	-26.84%
Vicente Pedilla (P)	-29.93%

Players Who Remained the Same

<u>Player</u>	<u>% Change</u>
Frank Catalanotto (H)	-1.84%

Neal Huntington

Players Who Improved

<u>Player</u>	<u>% Change</u>
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N/A	
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Players Who Declined

<u>Player</u>	<u>% Change</u>
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N/A	
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Players Who Remained the Same

<u>Player</u>	<u>% Change</u>
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Francisco Liriano (P)	-1.95%
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Brian Cashman

Players Who Improved

<u>Player</u>	<u>% Change</u>
Mike Stanton (P)	27.64%
Mariano Rivera (P)	23.66%

Players Who Declined

<u>Player</u>	<u>% Change</u>
Scott Brosius (H)	-25.45%
Jason Giambi (H)	-23.30%
Gary Sheffield (H)	-17.49%
Jorge Posada (H)	-30.76%
Álex Rodríguez (H)	-19.61%
Mark Teixeira (H)	-16.34%
Derek Jeter (H)	-31.33%
Brian McCann (H)	-14.21%
Jacoby Ellsbury (H)	-20.62%
Carlos Beltran (H)	-30.24%
Chase Headley (H)	-22.90%
Carl Pavano (P)	-38.71%
Kyle Farnsworth (P)	-5.67%
A.J. Burnett (P)	-24.92%

Players Who Remained the Same

<u>Player</u>	<u>% Change</u>
Bernie Williams (H)	2.09%
Johnny Damon (H)	-3.37%
Mike Mussina (P)	3.95%
CC Sabathia (P)	-4.74%

Dayton Moore

Players Who Improved

<u>Player</u>	<u>% Change</u>
Gil Meche (P)	181.01%
Ian Kennedy (P)	778.21%

Players Who Declined

<u>Player</u>	<u>% Change</u>
José Guillén (H)	-49.77%
Omar Infante (H)	-44.91%
Alex Gordon (H)	-34.31%
Jeremy Guthrie (P)	-19.49%
Jason Vargas (P)	-12.05%

Players Who Remained the Same

<u>Player</u>	<u>% Change</u>
N/A	

Dave Dombrowski

Players Who Improved

<u>Player</u>	<u>% Change</u>
Victor Martinez (H)	13.49%
Joaquin Benoit (P)	76.98%

Players Who Declined

<u>Player</u>	<u>% Change</u>
Iván Rodríguez (H)	-8.01%
Alex Fernandez (P)	-14.26%
Aníbal Sánchez (P)	-5.37%
David Price (P)	-16.70%

Players Who Remained the Same

<u>Player</u>	<u>% Change</u>
Magglio Ordóñez (H)	0.05%

Dan Duquette

Players Who Improved

<u>Player</u>	<u>% Change</u>
Tim Wakefield (P)	151.02%
Darren O'Day (P)	8.16%

Players Who Declined

<u>Player</u>	<u>% Change</u>
Darren Lewis (H)	-13.12%
José Offerman (H)	-18.55%
Chris Davis (H)	-42.26%
Bret Saberhagen (P)	-14.95%
Ubaldo Jiménez (P)	-26.80%

Players Who Remained the Same

<u>Player</u>	<u>% Change</u>
Jeff Frye (H)	-1.04%
Manny Ramírez (H)	-1.23%
Johnny Damon (H)	-0.74%
Tom Gordon (P)	3.54%

Doug Melvin

Players Who Improved

<u>Player</u>	<u>% Change</u>
Aramis Ramírez (H)	28.85%
John Wetteland (P)	11.72%

Players Who Declined

<u>Player</u>	<u>% Change</u>
Mark McLemore (H)	-8.36%
Damian Miller (H)	-17.06%
Kenny Rogers (P)	-7.51%
Jeff Suppan (P)	-38.13%
David Riske (P)	-57.73%
Randy Wolf (P)	-22.77%
Matt Garza (P)	-46.72%

Players Who Remained the Same

<u>Player</u>	<u>% Change</u>
Rafael Palmeiro (H)	-1.49%
Álex Rodríguez (H)	4.12%

Billy Beane

Players Who Improved

<u>Player</u>	<u>% Change</u>
Gil Heredia (P)	175.25%

Players Who Declined

<u>Player</u>	<u>% Change</u>
John Jaha (H)	-9.69%
Mike Magnante (P)	-12.33%

Players Who Remained the Same

<u>Player</u>	<u>% Change</u>
N/A	

John Mozeliak

Players Who Improved

<u>Player</u>	<u>% Change</u>
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Randy Choate (P)	8.24%
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Players Who Declined

<u>Player</u>	<u>% Change</u>
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Matt Holiday (H)	-10.44%
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Players Who Remained the Same

<u>Player</u>	<u>% Change</u>
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Jhonny Peralta (H)	-3.93%
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